

**ACUTE COMMUNICABLE DISEASE CONTROL
SPECIAL STUDIES REPORT
1996**



**County of Los Angeles
Department of Health Services**

**Public Health Programs
Disease Control Programs**

County of Los Angeles • Department of Health Services
Public Health Programs
Disease Control Programs
Acute Communicable Disease Control Unit
313 N. Figueroa Street, Room 212
Los Angeles, CA 90012
(213) 240-7941

Published July 1999

**ACUTE COMMUNICABLE DISEASE CONTROL
SPECIAL STUDIES REPORT, 1996**

CONTRIBUTORS

Director, Disease Control Programs Shirley L. Fannin, MD

Acute Communicable Disease Control Unit Chiefs & Program Directors

Acute Communicable Disease Control Laurene Mascola, MD, MPH, Chief

Immunization Program Akiko Kimura, MD, Medical Director; Cheri Todoroff, MPH, Director

Acute Communicable Disease Special Reports

An Outbreak of *Salmonella heidelberg* in a Neonatal Intensive Care Unit
..... Roshan Reporter, MD, MPH; Nancie S. Bendaña, RN, MS

Botulism Summary, 1996 David E. Dassey, MD, MPH

Hepatitis A Outbreak Associated with a Catering Service Michael Lim, MPH

Invasive Group A Streptococcal Disease, 1996 Carol Peterson, MD, MPH

Nosocomial Scabies Outbreaks in Acute Care Facilities,
Los Angeles County, 1996 Nancie S. Bendaña, RN, MS

Prevention of *Vibrio vulnificus* Infections Eric Mouzin, MD, MPH;
..... Laurene Mascola, MD, MPH; Michael P. Tormey, MPH; David E. Dassey, MD, MPH

Salmonella Serotype *enteritidis* in Los Angeles County, 1996 Roshan Reporter, MD, MPH

Varicella Active Surveillance and Epidemiologic
Studies, 1995-1996 Carol Peterson, MD, MPH

1996 Retrospective Kindergarten Survey: Vaccination Coverage Estimate
for Preschool-Aged Children in Los Angeles County Loren Lieb, MPH

Editors Nancie S. Bendaña, RN, MS; Roshan Reporter, MD, MPH

Style Editor Esther Parker

TABLE OF CONTENTS

| | |
|--|----|
| An Outbreak of <i>Salmonella heidelberg</i> in a Neonatal Intensive Care Unit | 1 |
| Botulism Summary (excluding Infant Botulism), 1996 | 5 |
| Hepatitis A Outbreak Associated with a Catering Service | 7 |
| Invasive Group A Streptococcal Disease, 1996 | 10 |
| Nosocomial Scabies Outbreaks in Acute Care Facilities Los Angeles County, 1996 | 14 |
| Prevention of <i>Vibrio vulnificus</i> Infections | 18 |
| Salmonella Serotype <i>enteritidis</i> in Los Angeles County, 1996 | 21 |
| Varicella Active Surveillance and Epidemiologic Studies, 1995-1996 | 24 |
| 1996 Retrospective Kindergarten Survey: Vaccination Coverage Estimate for Preschool-Aged Children in Los Angeles County | 28 |

AN OUTBREAK OF *SALMONELLA HEIDELBERG* IN A NEONATAL INTENSIVE CARE UNIT

BACKGROUND

On September 6, 1996, the Acute Communicable Disease Control Unit (ACDC) was informed of two infants with cultures positive for *Salmonella* group B. Case-infant A's infection was detected in both a urine and stool culture collected September 3. Case-infant B's infection was detected in a stool culture collected September 4. Both infants were in the same hospital neonatal intensive care unit (NICU). On September 9, two additional NICU infants were reported to have blood and stool (case-infant C) and stool only (case-infant D) cultures collected September 7 positive for *Salmonella* group B. None of the four case-infants were reported to be in the same cubicle at the time of their positive culture, and infant feedings varied from infant to infant. No other infants were reported ill with sepsis or diarrhea and no nursing staff reported symptoms of gastrointestinal illness during the two-week period between August 27-September 9.

METHODS

Case Definition. A case was defined as any infant in the NICU with a culture from any site positive for *Salmonella heidelberg* resistant to ampicillin and cefazolin and onset of symptoms between August 31 and September 5.

Case-finding. Daily surveillance stool cultures were taken on all infants in the NICU. Approximately 200 staff including volunteers, nurses, physicians, and ancillary personnel were identified for screening cultures. Physicians and families of infants present in the NICU between August 24 and September 9 were notified of possible exposure to *Salmonella* and were instructed to contact the hospital if any infant developed diarrheal illness. Public health district staff interviewed case-infant families to determine whether any immediate family members or visitors to the NICU were previously or currently ill with diarrheal symptoms, and obtained detailed maternal histories and stool cultures for bacteriologic examination on each family member. Maternal-infant histories and stool cultures also were obtained on 13 of 14 mother-infant pairs who were discharged between August 27 and September 7 and who were not screened prior to discharge.

Control Measures Taken by Hospital. On September 6, case-infants A and B followed by case-infants C and D on September 9, were placed in Bay 1, the designated isolation area and were attended by dedicated nursing staff for each shift. Visitation was restricted to parents and grandparents only. Case-infants remained cohorted on contact precautions until three negative cultures were obtained 48 hours after antibiotics were discontinued. All isolettes in the three other bays were systematically removed, cleaned and returned within a two-day period. Inservice education on prevention of enteric disease transmission was provided for all NICU employees and volunteers.

County of Los Angeles • Department of Health Services
Acute Communicable Disease Control
Special Studies Report 1996

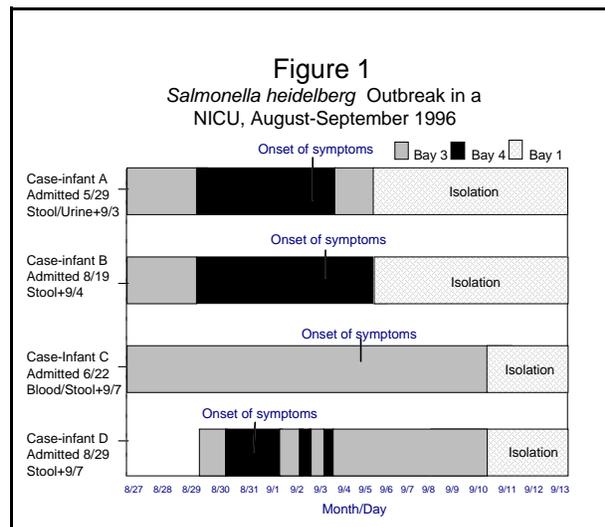
Site Visit. A site visit with a Health Facilities licensing surveyor was conducted on September 13. The physical layout of the NICU was observed and procedures for the preparation, storage and administration of infant feedings and medications, diaper changing/disposal, and environmental cleaning were reviewed. Procedures for admission and intra-NICU movement of infants, staffing patterns, and volunteer duties and training curriculum also were reviewed.

Microbiologic Studies. Case isolates were sent to the Public Health Laboratory for serogroup identification. Susceptibility patterns from case isolates were compared with four community *S. heidelberg* isolates with August 1996 culture dates. Between September 9 and 16, infection control staff cultured 33 environmental surfaces in the NICU. Six additional surface cultures were taken in the hospital's microbiology laboratory after a false-positive screening culture was reported as the result of cross-contamination with a case-infant's specimen.

Cohort Study. ACDC initiated a cohort study to determine risk factors for transmission of salmonellosis in the NICU. The cohort consisted of all infants in the NICU between August 30 and September 5, 1996 (N=44). Mother and infant charts were reviewed for prenatal and delivery history, medical conditions, signs and symptoms of gastrointestinal infection or sepsis, invasive procedures, antibiotic usage, medications, dietary supplements, diet and feeding method, culture results, room assignments and staff contact. Nursing, volunteer, and neonatologist assignments also were reviewed. Data analysis was performed using SAS version 6.11.

RESULTS

Description of Case-Infants. Case-infants (N=4) ranged in age from 2 days to 2 months at the time of illness and onset of symptoms occurred between August 31 and September 5 (Figure 1). Case-infant A had a positive stool and urine culture collected September 3; case-infant B, a positive stool culture from September 4; case-infant C, a positive blood and stool culture from September 7; and case-infant D, a positive stool culture from September 7. During each case-infant's respective incubation period (6 to 72 hours prior), each had shared a bay with at least one other case-infant; three of the four case infants were together in Bay 4 during their incubation periods. Only two of the case-infants were on the same formula during the incubation period; of the two who received breast milk, one did so nine days prior to onset and the other four days after onset of symptoms.



County of Los Angeles • Department of Health Services
Acute Communicable Disease Control
Special Studies Report 1996

Casefinding. No additional culture-confirmed cases were identified among infants, mothers, NICU staff members or their household members. However, the mother of case-infant D had been treated for a chlamydia infection with amoxicillin in March 1996, followed by a course of erythromycin in April 1996 and complained of low abdominal and back pain on August 13. She was admitted for premature labor to another facility August 24 and placed on ampicillin for a group B streptococcal infection. On August 27 she developed loose stools without fever; however, no stool cultures were taken at that time. On August 29 she was transferred to this facility and delivered. Case-infant D developed gastrointestinal symptoms on August 31. Stool cultures taken on the mother more than two weeks' postpartum, were negative for *Salmonella*. Two NICU nurses tested positive for two *Salmonella* serogroups which were different from the outbreak serogroup; however, there was no known illness among NICU infants or staff associated with these findings.

Site Visit. The licensed capacity of the NICU was 33 beds which were distributed in four different bays. The most critically ill infants were housed in Bays 1 and 2 and infants were admitted through Bay 2. Bay 4, which was located on another floor, served as an overflow unit. When census was low, infants in this bay were moved back to one of the other bays and infant movement between bays occurred frequently. Staffing for the most critical infants was 1:1 or 1:2, and for the more stable infants, 1:3. Medications were individually stored for each infant. Oral medications were usually added to the formula or breast milk and administered by gavage or bottle. Sterile water was used to prepare formula; however, nurses did not routinely glove during preparation of infant feedings. In Bay 4, the scale used to weigh soiled diapers was located on one side of a sink; infant feedings were prepared on the other side.

Laboratory Results. All four case-infant isolates were identified as *Salmonella heidelberg* and were resistant to ampicillin and cefazolin. Three of the four community isolates were susceptible to all drugs tested including ampicillin and cefazolin, and one was resistant to gentamicin only. *S. heidelberg* is the third most common *Salmonella* serogroup identified in the County and *Salmonella* organisms are generally susceptible to most antimicrobial agents. All environmental cultures were negative for *Salmonella*.

Cohort Study. Four cases and 37 noncases were included in the study. Three infants were excluded: one because no stool culture was obtained to rule out infection, another because the length of stay in the NICU was only a few hours, and the other because the infant received vancomycin therapy for bloody diarrhea, onset August 22, and had no pretreatment stool culture. Cases did not differ from noncases by sex, race, Apgar score, birth weight, birth length, gestational age, gravidity, parity or age of mother. There was no association between *Salmonella* infection and use of oral medications or antibiotics, formula type, feeding method, or invasive procedure. Statistical analysis showed the greatest risk of illness to be associated with stay in Bay 4 between the PM shift on August 30 and PM shift on September 1 ($p < .05$). Although the patients did not share the same primary nurse, it is common practice in NICUs that nursing staff cross-cover for one another during a given shift. Doctors 1 and 2 showed statistically significant associations with the cases ($p < .05$). Nursing staff contacts were too numerous and complex to analyze.

CONCLUSION

The most likely source of this outbreak was case-infant D who had the earliest onset of diarrhea (August 31) and whose mother had received three courses of antibiotic therapy during her pregnancy and was ill with diarrhea of unknown etiology prior to a preterm delivery. The gastrointestinal illness may have been a factor in her premature labor. Other case-infants were most likely infected between August 30 and September 1 by caregivers' contaminated hands or by contaminated equipment. Three of the four infants were likely infected in Bay 4 which had constant infant movement as patient census shifted, increasing the likelihood of cross-contamination through breaks in infection control practices such as handwashing and aseptic technique.

DISCUSSION

Obstetricians should request stool cultures on women who have diarrhea during labor since gastrointestinal infections often lead to preterm labor, chorioamnionitis or infection of the infant at birth. Resistance of the outbreak strain of *S. heidelberg* to ampicillin and cefazolin, compared with community isolates which were susceptible, supports the hypothesis that case-infant D's infection was likely maternally acquired, given an antepartum history of multiple antibiotics. NICU staff should suspect an infectious etiology in infants with signs of sepsis, feeding intolerance, or an increase in frequency of stools. These infants should be placed on contact precautions and blood, urine, and stool samples should be collected for bacteriologic examination. Increased diligence regarding handwashing, aseptic technique, and attention to maintaining distinctly separate clean and dirty areas is essential given the frequency of feeding and diaper changing that occurs in a nursery setting.